DISCOVERY OF THE ORIENTAL LATRINE FLY *CHRYSOMYIA MEGACEPHALA* (FABRICIUS) ALONG THE SOUTH-WESTERN COAST OF SOUTH AFRICA

By

A. J. Prins

South African Museum, Cape Town

(With 5 figures)

[*MS. accepted 4 January 1979*]

ABSTRACT

While investigating the biology and life histories of certain Diptera infesting decaying seaweed and organic matter along the shore, *Chrysomyia megacephala* was discovered during March 1978 in association with *Lucilia sericata* in a dead sea-gull at Ysterfontein.

It could have reached the coast either as a mature fly or as an immature stage by drifting ashore from passing ships.

Adult and immature stages are described and compared with those of the related *Chrysomyia chloropyga*. Third stage larvae of these two species differ only slightly, but differences between the male genitalia are fairly conclusive. Both immature and adult stages are quite different from those of *L. sericata*.

It was not possible to determine the length of the larval life, but pupal stages lasted 4 days at room temperature.

CONTENTS

INTRODUCTION

While investigating the biology and life histories of certain Diptera frequenting and infesting decomposing seaweed and organic matter along the coast and shores of the southern and western Cape, the author made an important discovery, namely the occurrence of the oriental latrine fly *Chrysomyia megacephala* (Fabricius) in South Africa.

As this species of *Chrysomyia* has never before been found in South Africa, it is important that certain observations made on the material at the author's disposal, its life history, imago, larval and pupal stages, should be recorded to enable its future identification and separation from the related and known South African species of *Chrysomyia* and those of the genus *Lucilia*.

The oriental latrine fly, also known as the Indian Bazaar bluebottle, is widely distributed in the Far East, including Australasia. Although it occurs in the Malagasy Region, it was unknown in Africa until its recent discovery in Ghana and Senegal during 1977 (Kurahashi 1978). However, dead sea-gulls collected at Ysterfontein beach during March 1978 produced about six maggots

Ann. S. Afr. Mus. **78** (5), 1979: 39–47, 5 figs.

of this species from which three adult flies were reared. These maggots were in association with those of the green blowfly (common green-bottle) *Lucilia sericata* (Meigen) which formed the main constituent of this population. Several further attempts to collect more specimens along this coast from Milnerton to Saldanha were in vain. Despite the isolation of this discovery, it was considered important enough to give a brief description of the stages that were found for comparison with the related *C. chloropyga* (Wiedemann) and with *L. sericata* and to attempt a possible explanation of the fly's appearance at Ysterfontein.

METHOD

Maggots that had been collected from dead sea-birds found on the beaches along the west coast from Milnerton to Elands Bay were sorted into different groups according to the size and shape of the posterior spiracles. They were then placed into glass jars containing a pupation medium of clean, damp beach sand. Their natural food was supplied as far as possible and the jars were covered with gauze cloth to prevent the adults from escaping. Slides were made of the genitalia and the drawings were made by means of a camera lucida.

DISCUSSION

Ships from the Far East *en route* to Europe pass the west coast of South Africa in the vicinity of Dassen Island at an average distance of about 10 to 13 km from the shore. Ordinary house-flies have been found to travel about 33 km (Oldroyd 1964), and Hindle (1914: 311) even states, 'After a careful examination of all our results we can state definitely that flies tend to travel either directly against or across the wind'. He states further (Hindle 1914: 321), 'Flies may travel against the wind, being attracted by any odours it may convey from a source of food'. It is, therefore, possible that blowflies on a passing ship could have reached the shore and survived long enough to find a suitable breeding medium.

C. megacephala is a necrophagous species (Patton 1922) with an apparently long life-span. According to Wijesundara (1957*b*) the mean duration was 57 days at a room temperature of 24 to 29°C and a relative humidity ranging from 72 to 100 per cent, a condition which is similar to that along our west coast. The average percentage humidity, recorded by the Department of Transport in the Langebaan Road area during November to March for the period 1975 to 1977, varied from 60 to 70 per cent. This ability, together with a fairly short larval life of a little more than 3 to about 5 days (Wijesundara 1957*a*) probably contributed to its presence at Ysterfontein. Surface drift could also account for its presence, as species of the warm-water plankton of the Indian Ocean have often been found on the beaches north-west of Cape Town. It is also a well-known fact that the seeds of the legume *Mucuna gigantea quadrialata* from East Africa are sometimes washed up on the beach at Lambert's Bay (Muir 1932, 1934). Water of the warm Agulhas current mixed with cold Atlantic

water is often pushed round the Cape of Good Hope (Isaac 1937), the penetration being at maximum during the summer and autumn and is 'aided by the South East Trade winds' (Shannon 1966) and may even reach as far north as 32°S (Shannon 1966; Schell 1968). The presence of this surface water around Dassen Island will inevitably result in the drifting ashore near Ysterfontein of infested refuse or debris thrown overboard from a ship passing this area during the late summer, especially trawlers which often sail very close to the shore.

DESCRIPTION OF THE STAGES

IMAGO (Fig. 1A–C)

Metallic greenish with narrow blackish crossbands on the posterior borders of the abdominal segments, rather similar to *C. chloropyga* both in size and appearance, but lacking the ⊥⊥ marks on the presutural area of the mesonotum. Genal area and genal hairs of the flies collected were of a definite golden yellow. Antennal segments reddish, the arista brown. Anterior thoracic spiracle blackish-brown. (In all the other South African species of *Chrysomyia* found in decaying birds along the coast, the spiracles are white or light coloured.) The silky hairs on the sternopleuron are dark to almost blackish, especially in the male; in both *C. chloropyga* and *C. albiceps* the hairs are pale to almost white.

The males are easily separated from the females, and from those of other South African species belonging to this genus, by the sharply demarcated large upper and smaller lower facets of the compound eyes (Fig. 1C). They are also easily separated from the males of the other species by the rounded anterior borders of the head when seen from above (Fig. 1B), the parafrontalia not protruding (it is protruding in the other South African species).

As in *C. chloropyga* only two vertical bristles are present in the males (Fig. 1B–D), but they are much shorter in *C. megacephala.* In both the above species the prostigmatic bristles are present, but absent in *C. albiceps* which, in addition, has four verticals, both in the males and females. *L. sericata*, which also has prostigmatic bristles and two verticals in the case of the males, may easily be separated from *Chrysomyia* species by the more strongly developed acrosticals on the presutural area of the mesonotum, especially in the males. Genitalia also differ.

In the male genitalia of *C. megacephala* the cerci and paralobi of the epandrium (Fig. 2E) differ from those of *C. chloropyga* (Fig. 2B), especially the paralobi which have much broader bases. This is easily seen in the mounted specimens. The phallosome has broad membranal lobi in both *C. megacephala* (Fig. 2F–G) and *C. chloropyga* (Fig. 2C–D), the theca (not visible in the drawings) is small in both, the phallus elongated and sclerotized, the harpes much longer in *C. megacephala* than in *C. chloropyga* and also closer together, and the vesicae (as in *C chloropyga*) situated further towards the apex between the lobi. In *L. sericata* the harpes (Fig. 2H) are long and display almost the same

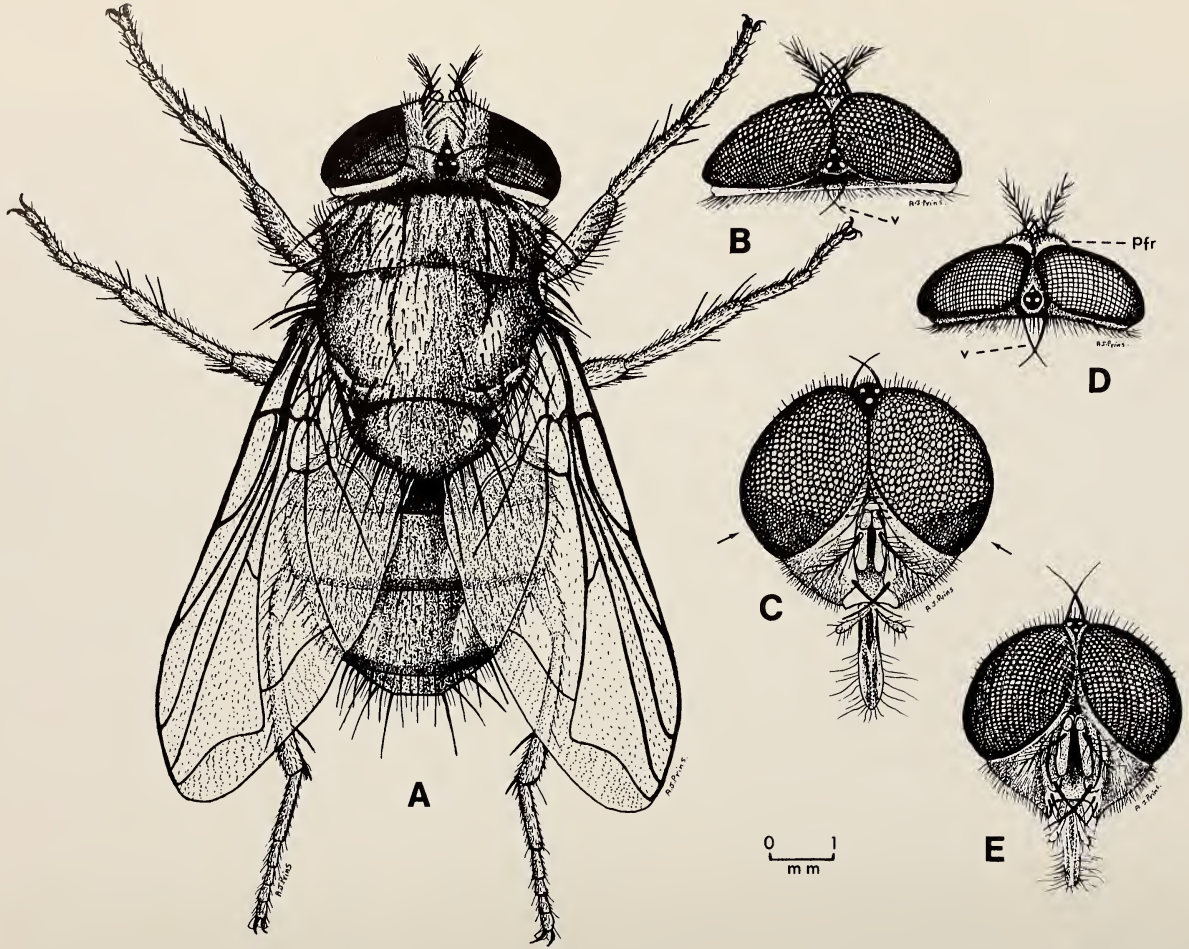

Fig. 1. A–C. *Chrysomyia megacephala*.
A. ♀. B. Head of ♂ from above. C. Head of ♂ from the front. D–E. *Chrysomyia chloropyga*. D. Head of ♂ from above. E. Head of ♂ from the front. Pfr—parafrontalia, v—verticals.

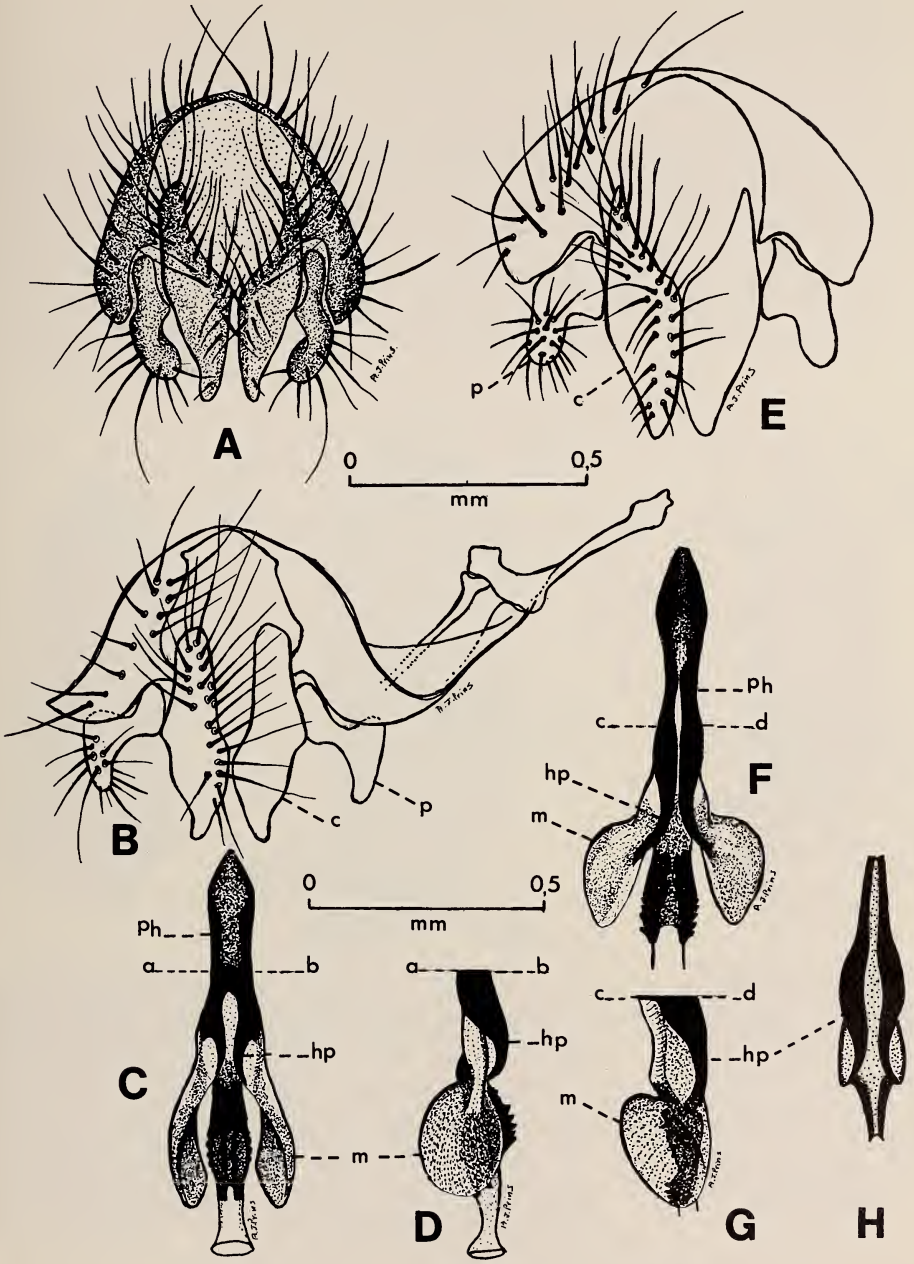

Fig. 2. Male genitalia.

A–D. *Chrysomyia chloropyga*. A. Cerci and paralobi (living specimen). B. Cerci and paralobi (slide). C. Phallosome (slide). D. Apical part of Phallosome from side.

E–G. *Chrysomyia megacephala*. E. Cerci and paralobi (slide by Dr Zumpt). F. Phallosome (slide). G. Apical part of Phallosome from side. c—cercus, hp—harpes, m—membranal lobus, p—paralobus, Ph—phallus.

H. *Lucilia sericata*. Apical part of Phallosome from the front.

pattern as in *C. megacephala*, although they are further apart when seen from above and the broad lobi are absent.

LARVA (Fig. 3A–F)

The various larval instars have been described by Patton (1922*a*, 1922*b*), Wijesundara (1957), and Zumpt (1965). During the recent surveys only third instar maggots which were almost inseparable from those of *C. chloropyga* were collected.

In specimens that were examined, the dorsal outline of the labial sclerites or mouth hooks of the cephalopharyngeal skeleton (Fig. 3C) when seen from the side is widely convex, meeting the superior basal face in a somewhat rounded

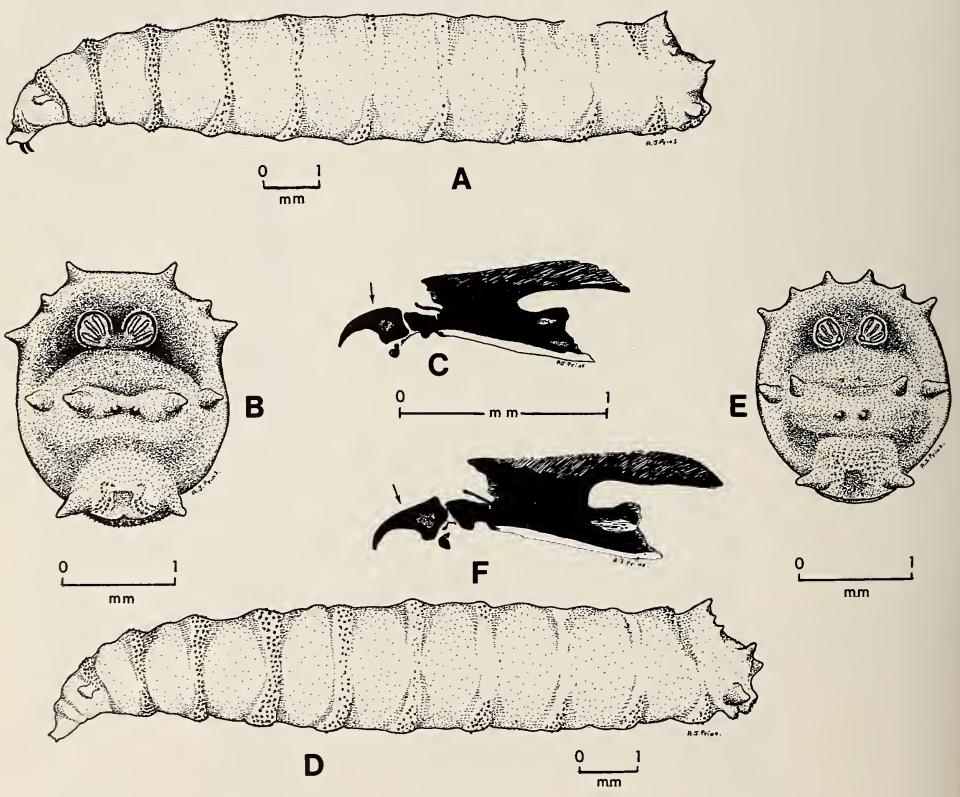

Fig. 3.

A–C. *Chrysomyia megacephala*. A. Full-grown maggot from side. B. Posterior part of maggot showing the spiracles. C. Cephalo-pharyngeal skeleton.

D–E. *Lucilia sericata*. D. Full-grown maggot from side. E. Posterior part of maggot showing the spiracles.

F. *Chrysomyia chloropyga*. Cephalo-pharyngeal skeleton.

angle. In *C. chloropyga* the dorsal surface is more straight and posteriorly even slightly concave and meets the superior basal face in a somewhat raised and more acute angle (Fig. 3F); this appeared to be the only difference between the two species. Zumpt (1965: 90) maintains that the distance between the posterior peritremes may serve to distinguish the larvae of *C. megacephala* from *C. chloropyga*; however, the few maggots of *C. megacephala* examined differ considerably in this character. In the sample made the peritremes are separated by one-third to four-sevenths of this diameter in *C. megacephala* and by three-eighths to five-ninths the diameter in *C. chloropyga*. Separation of the two species by means of this characteristic therefore seemed impossible. They are, however, easily distinguished from the larvae of *L. sericata* which has closed peritremes (Fig. 3E).

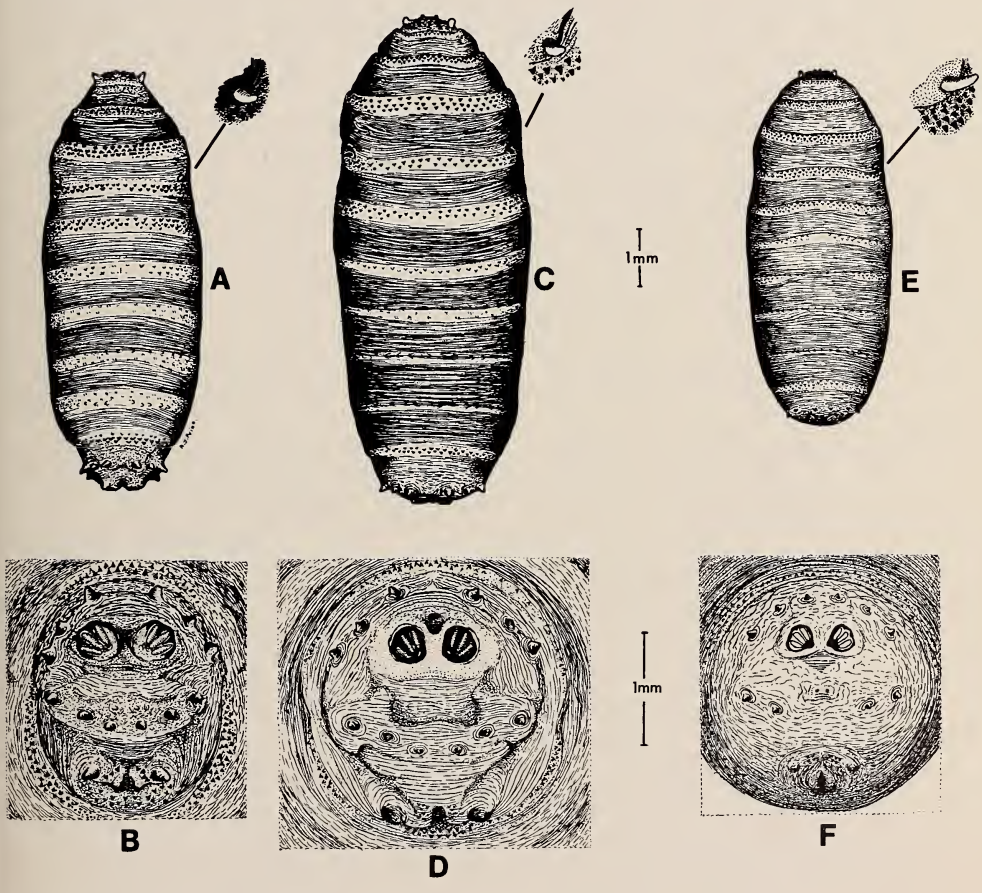

Fig. 4. A, C, E. Puparia from above. B, D, F. Posterior parts of puparia showing the projections and spiracles.

A–B. *Chrysomyia chloropyga*. C–D. *C. megacephala*. E–F. *Lucilia sericata*.

PUPARIUM (Figs 4A–F, 5A–C)

Brown to mahogany brown and finely and transversely striate with very short, brown respiratory horns (Fig. 4C). The posterior projections round the stigmal plates small to almost obsolete, the ridge bearing the projections not so well marked as in specimens of *C. chloropyga* that were examined. Posterior spiracles only slightly protuberant. Pupae found vary from 8,6 to 9,3 mm in length. In *C. chloropyga* the pupae are usually brown after pupation but soon become dark-brown to almost black, otherwise they are similar to those of *C. megacephala* except that the anterior apex is more triangularly shaped (Fig. 4A) and the posterior spiracles much more protuberant. The posterior projections are usually better developed and the spinules on the anterior part of the body also much stronger in *C. chloropyga*. In *L. sericata* (Figs 4E–F, 5A) the transverse striations on the body are very fine and sometimes even obsolete and the posterior projections usually inconspicuous to very small. The posterior

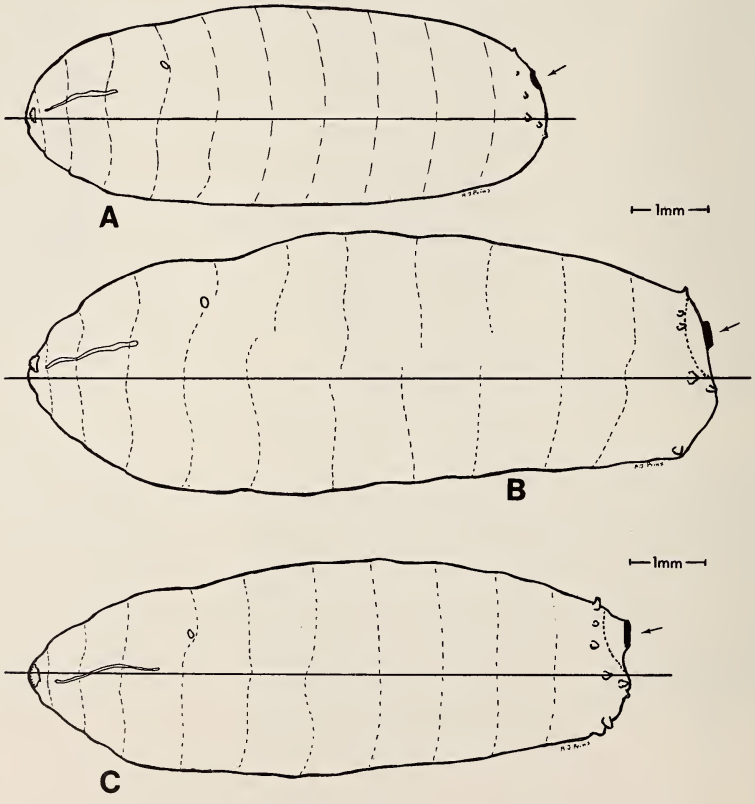

Fig. 5. Puparia from the side.
A. *Lucilia sericata*. B. *Chrysomyia megacephala*. C. *C. chloropyga*.

end of the puparia is rounded in this case and the posterior spiracles are flush with the surface.

BIOLOGY

The life history of this fly is described by Wijesundara (1957*a*, 1957*b*) who gives the mean duration of the whole cycle in Ceylon from egg to adult as 8 days and 12 hours of which 100 hours are occupied by the pupal stage. It was impossible to determine the larval life from the specimens collected as they were nearly mature, but the pupal stage lasted four days at a room temperature of 29°C, the flies emerging long before *Lucilia* in which case the pupal stage was 7 to 8 days.

According to Zumpt (1965) the larvae may become facultative parasites in man and animals.

ACKNOWLEDGEMENTS

I wish to express my gratitude to Dr A. J. Hesse, formerly of the South African Museum, for his advice and encouragement regarding the contents of this manuscript and to Dr F. Zumpt of the South African Institute for Medical Research for his comments and for identifying the flies.

I am very grateful to my wife for advice and support and to Miss H. Rae for typing the manuscript. Special thanks to Dr V. B. Whitehead, of the South African Museum, for recommendations, and to Mr G. Avery, also of the South African Museum, for collecting the various birds.

REFERENCES

Hindle, E. 1914. The flight of the house fly. *Proc. Camb. phil. Soc.* **17**: 310–313.

Isaac, W. E. 1937. South African coastal waters in relation to ocean currents. *Geogrl Rev.* **27**: 651–664.

Kurahashi, H. 1978. The oriental Fly: *Chrysomyia megacephala* (Fab.) newly recorded from Ghana and Senegal, West Africa. *Kontyn, Tokyo* **46**: 432.

Muir, J. 1932. The beach drift of South Africa. *J. Bot. Soc. S. Afr.* **18**: 5–10.

Muir, J. 1934. The correlation of arrival sites of alien seeds with ocean currents. *S. Afr. geogr. J.* **17**: 13–18.

Oldroyd, H. 1964. The natural history of flies. London: Wiedenfeld and Nicolson.

Patton, W. S. 1922*a*. Some notes on Indian Calliphorinae Part III. *Chrysomyia megacephala* Fab. (Dux Esch), the common Indian bluebottle whose larvae occasionally cause cutaneous myiasis in animals and *Chrysomyia nigriceps* sp. nov., the common bluebottle of the Nilgiris. *Indian J. med. Res.* **9**: 555–560.

Patton, W. S. 1922*b*. Some notes on Indian Calliphorinae Part VI. How to recognise the Indian Myiasis producing flies and their larvae, together with some notes on how to breed them and study their habits. *Indian J. med. Res.* **9**: 635–653.

Schell, I. I. 1968. On the relation between winds off South West Africa and the Benguela Current and Agulhas Current penetration in the South Atlantic. *Dt. hydrogr. Z.* **21**: 109–117.

Shannon, L. V. 1966. Hydrology of the South and West coasts of South Africa. *Investl Rep. Div. Sea Fish. S. Afr.* **58**: 1–62.

Wijesundara, D. P. 1957*a*. The life history and bionomics of *Chrysomyia megacephala* (Fab.). *Ceylon J. Sci.* (B) **25**: 169–185.

Wijesundara, D. P. 1957*b*. On the longevity of the adult of *Chrysomyia megacephala* (Fab.) under controlled humidity. *Ceylon J. Sci.* (B) **25**: 187–192.

Zumpt, F. 1965. Myiasis in Man and animals in the old world. London: Butterworths.